

## Chapter 8

### Data Quality Management

#### 8-1. Chemical Data Quality Management

*a. General USACE controls.* MW sites involve chemical contamination investigations, design, and remedial action activities. These activities must be conducted in full compliance with all applicable federal and state regulatory requirements. A plan for chemical data quality management (CDQM) is necessary to ensure full compliance and to assure chemical analytical data obtained are of sufficient quality to meet the intended usage within the project. ER 1110-1-263, "Chemical Data Quality Management for Hazardous Waste Remedial Activities," directs CDQM efforts for MW remedial action sites. ER 1110-1-263 includes:

- (1) Guidelines for project-specific designation and validation of USACE Quality Assurance Laboratories.
- (2) A listing of required CDQM submittals, including chemical data acquisition plans, quality control reports, quality assurance reports, and other documentation.
- (3) A matrix of CDQM organizational responsibilities.
- (4) A guide to USACE Chemical Quality Assurance Procedures.
- (5) Contract laboratory validation procedures.
- (6) A guide to preparation of the chemical data acquisition plan.
- (7) A description of the components of USACE chemical quality assurance.
- (8) Protocols for handling hazardous chemicals.

*b. Data quality management relative to radioactive materials.*

(1) USACE requirements. Examination of the general list above and the referenced ER shows no reference to radioactive and mixed waste materials. The procedural requirements in the ER apply to radioactive chemicals as well as nonradioactive chemicals and the absence of direct reference does not lessen the prescriptions for CDQM as applied to chemical analyses of samples from MW or LLRW sites. Where direction from the ER is

incomplete, the guidelines of DOE and other agencies may be applied, together with case-by-case special controls of radiological data quality management that are fully documented and approved upwards through USACE.

(a) Quality assurance procedures incorporating radiological considerations. There is no scientific or technical reason why radioactive material analyses cannot be treated in the management and reporting schemes as a part or facet of CDQM. Some laboratories will not be eligible to be selected or validated for radiochemistry analysis services because of lack of capability, but the services are available elsewhere. Because radioactive materials are incorporated in the samples from an MW site, it will be necessary to verify the candidate laboratory radiation safety procedures and pertinent permits from local, state, and federal agencies. Examination of the guidelines for commercial laboratory validation and monitoring indicates nothing predicating against radiochemistry analyses being performed under the same basic guidances.

(b) Validation of USACE quality assurance (QA) and contract laboratories. The pertinent USACE District or Division initiates the designation of a Division QA laboratory and HTRW MCX approves and executes the designation. The QA laboratory, the scope of services desired, and any contracted laboratory analysis services that deal with MW must have personnel and equipment validated to be capable of handling radioactive materials. Storage and ultimate disposal of samples will be a complicating factor for many otherwise capable laboratory facilities. The disposal or cleaning of radioactively contaminated laboratory equipment and expendable supplies must be addressed as part of the validation of a laboratory. Some equipment items and services, specifically spectroscopic or activation analysis systems, may be more efficiently obtained under commercial contract than from USACE laboratories. The laboratory will require the presence of personnel trained in radiation protection practice and the adequate use of radiation monitoring equipment and other protective practices.

(c) Radiological data acquisition. A site-specific chemical data acquisition plan (CDAP) is a document required from a contractor or USACE office responsible for chemical data at hazardous waste sites. Because MW contains (by definition) chemically hazardous components, a CDAP will be required for remedial activities at MW sites. That CDAP will incorporate radiological data acquisition components. In the case of LLRW sites where the contamination is not strictly due to hazardous

or toxic chemicals, the guidance for developing a CDAP provided in Appendix D of ER 1110-1-263 will be used in appropriately augmented or adapted form for preparation of a CDAP emphasizing radioactive materials.

(2) Requirements of other agencies. General EPA quality assurance guidance is found in QAMS 005/80, "Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans" (EPA 1983). The DOE and the nuclear industry regulated by the NRC follow quality assurance guidance issued by the American Society of Mechanical Engineers, NQA-1 (1989 edition), "Quality Assurance Program Requirements for Nuclear Facilities." These two documents form the basis for ANSI/ASQC-E4, "Quality Assurance Program Requirements for Environmental Programs," which will be endorsed by DoD, DOE, and EPA after finalization. Detailed radioactivity data management directives which are site-specific are various issues of *Environmental Investigation Instructions* developed by the commercial operators of major DOE facilities, such as Hanford (Westinghouse Hanford Company 1989a and b). General directives concerning radioisotopic analyses are provided by the DOE Office of Environmental Restoration and Waste Management in "DOE Methods for Evaluating Environmental and Waste Management Samples" (DOE 1994). These are directives addressing environmental survey methods to be used on DOE sites to determine the existence and level of hazardous materials. The practices described below would be considered as "screening-level" measurements performed in the preliminary assessment and remedial investigations. The practices would be performed in appropriately qualified laboratory conditions on all recovered samples until accumulated information indicated discontinuance of radioactivity screening at particular locations.

(a) Gross alpha measurements are intended to indicate the presence of uranium, thorium, plutonium, americium, neptunium, radium, and other TRU elements. Gross beta measurements indicate the presence of strontium-90, radium-228, and cesium-137. Radon-222, a common decay product of radium, is difficult to detect and quantify and requires specialized investigation. The gross alpha count will be done on all samples potentially contaminated with an alpha-emitting radioisotope. Likewise, the gross beta count will be done most commonly using a low-background proportional counter on all samples potentially contaminated with a beta-emitting radioisotope. Tritium, carbon-14, and radioisotopes of iodine are, however, serious contaminants which require different, specialized detection methods. Specific isotopes will be determined only if the gross alpha

measurement, or the gross beta measurement, is greater than the instrument's natural background by a specified factor. The detection limit in radiochemistry is often accepted as three times the square root of the instrument background so the action level for further analyses must be greater than that to prevent costly false positives.

(b) A spectroscopic scan of gamma radiation from a sample is a simultaneous determination of the presence, identification, and quantification of particular gamma-emitting radioisotopes. The DOE-specified gamma scan is a 1,440-min accumulation of gamma radiation using a sodium iodide detector; however, site-specific contaminant species and energies may justify shorter counting periods. The most common radionuclides that are determined by a gamma scan are cesium-137, cobalt-60, and potassium-40. Other, more exotic radionuclide species are determinable if their concentrations are high enough.

(c) DOE environmental survey practices treat uranium and other specific radionuclides distinctly (DOE 1987). The presence and total concentration of uranium will first be determined chemically; then, if requested, the relative isotopic concentrations will be measured. The concentrations of plutonium, thorium, radium, strontium, and iodine are also to be measured chemically first, if requested, and the isotopic concentrations as requested. The radioisotopes tritium (hydrogen-3) and radon-222 require specialized analysis procedures. An alternative to the DOE environmental survey practices cited above may be more efficient and more suited to sites other than DOE. If the radioisotopic concentrations are desired, the radiochemical analyses for those concentrations may be performed and the separate isotopic concentrations added to provide total concentration.

## 8-2. Geotechnical Data Quality Management

*a. GDQM responsibilities.* Geotechnical data quality management (GDQM) is the development and application of policies and procedures to assure that quality geological and geotechnical data are obtained and used throughout the planning, characterization, design, construction, and operation of a project (Department of the Army 1992). The procedural requirements in the ER apply to radioactive chemicals as well as nonradioactive chemicals and the absence of direct reference does not lessen HQUSACE responsibility for GDQM implementation and execution support and oversight responsibilities for USACE-managed projects. USACE HTRW MCX has primary responsibility for assuring implementation of GDQM requirements in support of Superfund, DERP, Civil Works Water Resource projects, and non-mission

HTRW efforts. USACE HTRW MCX conducts technical reviews of GDQM predesign and design documentation. The USACE element responsible for executing predesign and design activities develops all GDQM documentation and assures that quality field work is done. The pertinent geographic USACE Division or District has responsibility for contract administration and quality assurance of HTRW remedial actions. Detailed, explicit guidance is provided therein for the installation of monitoring wells at HTRW sites. Requirements and protocols specific to sites contaminated with LLRW or MW will be added to this document as they are established.

*b. Geotechnical data assurance plan.* A document detailing the geotechnical data acquisition activities required on a project site should be a USACE contract requirement. This document should describe the planned geophysical program, hydrological and vadose zone investigation and testing program, geotechnical sampling and testing program, and topographical survey requirements. The document should present the rationale for each activity and the quality control measures to be used throughout the field and laboratory program, as well as the deliverables required. Detailed requirements should be specified in the contract documents.